Space Weather Forecast

Issued on Wednesday, 06 December 2023 at 01:09 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of isolated Moderate flares (R1-R2 Blackouts) throughout.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity is currently Moderate with the largest flare of the past 24 hours a Moderate flare at 05/0644 UTC from what an active region close to the northeast limb. There are currently 9 sunspot regions on the disc, with two regions having departed the disc during the past 24 hours. The two main complex regions on the disc are close to centre disc in the south. Both regions have grown longitudinally with some minor development of new spots, and one of them has briefly shown signs of increased magnetic complexity. The region in the northeast although relatively small, has been the most active region, responsible for the Moderate flares observed. The largest region on the disc is in the north, close to centre disc. It has seen the proliferation of a number of small intermediate spots and pores, but is otherwise unchanged. The remaining regions on the visible disc appear small and stable or in slow decay.

A number of Coronal Mass Ejections (CMEs) have been evident on coronagraph imagery during the past 24 hours. Analysis and Enlil modelling of these would suggest that none are considered Earth-directed. However, a filament eruption from the northwest disc around 05/2100 UTC appears to have produced a CME. Available imagery is currently limited for confident analysis of this feature, although a glancing blow may be possible on 11 Dec.

Solar Wind / Geomagnetic Activity: Solar wind parameters are indicative of the arrival of, and ongoing connection to a fast stream of winds from a coronal hole. Solar wind speeds, as observed by ACE at L1, increased from Elevated levels to Strong around 05/1045 UTC where they have largely remained, with a peak of around 660 km/s. The Interplanetary Magnetic Field (IMF), Bt, was initially moderate, but declined to weak levels at 05/1042 UTC where it has since remained. The important north-south component of the IMF (Bz), has been variable and weakly fluctuating.

Resultant Geomagnetic activity was Quiet to Unsettled (Kp 2-3).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) persisted at Background levels with no solar radiation storms occurring.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to be initially Moderate with a Chance of further isolated Moderate flares (R1-R2 Blackouts). The flare risk is likely to gradually decline by Days 3-4 (08-09 Dec) in the anticipated absence of new returning regions, although the Chance remains of isolated Moderate flares.

Solar Winds / Geomagnetic Activity: A Coronal Mass Ejection (CME) that left the Sun around 04/0700 UTC is expected to miss Earth, but there is a very slight chance of a glancing blow later Day 1 (06 Dec) or early Day 2 (07 Dec). There is low confidence in the behaviour of a further CME observed leaving the solar disc at 05/2100 UTC which may have an Earth-directed

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component. Otherwise, no further CMEs are currently thought to be Earth-directed during the period.

Enhancement of solar winds from a stream of fast winds from a coronal hole is expected to persist through Day 1 (06 Dec) with winds at Strong levels soon declining to Elevated levels. Winds are expected to slowly return to Slightly Elevated levels Days 2-3 (07-08 Dec), perhaps falling to slow-ambient levels by Day 4 (09 Dec) in the absence of any further CME enhancement.

Geomagnetic activity is expected to be largely Quiet to Unsettled through the forecast period (Kp 1-3). There is a chance during Day 1 (05 Dec) that influences from the HSS may see activity increase to Active (Kp 4) and a slight chance of G1/Minor Geomagnetic Storm (Kp 5) levels. This risk reducing into the period as solar winds ease. There is a slight chance on Day 3 (07 Dec) that a glancing blow from a CME produce an Active or G1/Minor Geomagnetic Storm interval, but this is considered a low probability.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is forecast to remain at background levels with no Solar Radiation Storms expected.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	5	5	1	2
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	40	40	30	30
Very Active	R3 to R5 X	No	5	5	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	10	10	10	10
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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